RATIONALIZATION OF A STRICTER FIRE SPRINKLER ORDINANCE FOR THE CITY OF EAU CLAIRE

EXECUTIVE LEADERSHIP

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ABSTRACT

The Eau Claire fire department is charged with the responsibility to protect its citizens from fire occurrences. However, upon evaluation of the current fire protection capabilities of the Eau Claire fire department and the minimum standards set by the State of Wisconsin and other agencies, the Eau Claire fire department cannot provide adequate fire protection to non-sprinkled buildings over 5000 square feet in the City of Eau Claire. The purpose of this research project was to evaluate and rationalize the need for a stronger sprinkler requirement for the City of Eau Claire.

This study used descriptive research methodology, supported by a survey of 35 larger Wisconsin cities and fire departments. The purpose of the survey was to capture information from those communities with stricter than state required sprinkler ordinances and formulate an understanding as to why more Wisconsin communities do not have stricter sprinkler requirements. A comparison of the 21 cities with stricter sprinkler ordinances was made to better understand the overall requirements of these communities. The following research questions were addressed:

1. To what standards and codes relating to fire sprinklers must the Eau Claire fire department and the City of Eau Claire adhere?
2. What do other Wisconsin communities and fire departments require in relationship to a stricter fire sprinkler ordinance?
3. According to the fire flow calculations, what size structure and type of structure should be sprinkled to ensure an adequate level of fire protection?

A literature review of the effectiveness of fire sprinklers, codes and standards, and the

importance of a sprinkler ordinance was also completed. As a result of this research, one will be able to better understand the required fire sprinkler protection in the cities with strict sprinkler ordinances.

The results of the research discovered that 32 percent of the fire departments surveyed require stricter sprinkler requirements than do other cities in the State of Wisconsin. The author offers several recommendations to promote a stricter sprinkler ordinance for the City of Eau Claire. These recommendations include development of a stricter ordinance; implementation of an education initiative for the city's governmental leaders; communication opportunities with contractors, builders, planners, architects; education of the community to explain how the benefits of a stricter ordinance will be beneficial; training for fire department personnel explaining stricter sprinkler ordinance benefits; and publishing the financial benefits and saving strategies for individuals and organizations that are involved with fire sprinklers.

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INTRODUCTION

During the 10-year period in the United States, 1986-1995, there was an average of 5,117 civilian fire deaths, 28,4000 civilian injuries, 56,260 fireground firefighter injuries, and $9.6 billion dollar loss from reported fires each year (USFA, 1998). According to the National Fire Protection Association (NFPA) the United States has a serious and substantial fire problem (USFA, 1993). Fire kills more people in the United States annually than all natural disasters (floods, hurricanes, tornadoes, earthquakes, and blizzards) combined (USFA, 1993). The rate of death from fire in the United States is significantly higher than in other industrialized nations (USFA, 1998). The economic implications of fire loss are staggering – such as the cost of firefighter services, the disruption of business operations after the fire, medical cost of that injured, etc. When these costs, the human and property losses directly due to fire, are combined the true cost of fire pushes up to $100 billion dollars a year (Hall, 1994). Countless agencies (USFA, NFA, NFPA, and NFSA) have identified that fire sprinkler systems can be a valuable tool in the reduction of fire loss in property, saving life, and maintaining fire protection cost to the city.

In the State of Wisconsin, the Wisconsin Administrative code regulates when and where fire sprinkler systems are to be installed. Fire officials often overlook the fact that the state codes are the minimum standard of regulation. One of the most important decisions a fire official can make is to explain the fire problem then recommend the adoption of an ordinance or resolution that could positively effect the fire problem to the city council, board of supervisors or other authority having jurisdiction (Coleman, 2000). All fire departments are charged with the responsibility to advise city management and the city council of innovative concepts that will

provide optimal fire protection to the community and to the citizens it serves.

For the past several years the Eau Claire fire department's Fire Prevention Division has been encouraging builders, architects, planners and contractors of the importance and benefits of fire protection systems installation, especially sprinkler systems. Even with this educational input, businesses, schools and significant industrial properties continue to be built without the protection of fire sprinklers. An evaluation of the current fire protection capabilities in the Eau Claire fire department justification shows that the Eau Claire fire department cannot provide adequate fire protection to non-sprinkled buildings over 5000 square feet (Appendix E).

The purpose of this research was to evaluate and justify the need for a stronger fire sprinkler requirement for the City of Eau Claire. The research is based on commercial properties, which look at the fire flow calculations. Research included investigating staffing levels needed to adequately respond. Descriptive research methodology was used, supported by an assessment of the department by the Insurance Services Office (ISO), an evaluation of department statistics relating to fire loss and fire death and injury, and a survey of 35 larger Wisconsin fire departments to answer the following questions:

1. To what standards or codes relating to fire sprinklers must the Eau Claire fire department and the City of Eau Claire adhere?
2. What do other Wisconsin communities and fire departments require in relationship to stricter fire sprinkler ordinance?
3. According to the fire flow calculations, what size structure and type of structure should be sprinkled to ensure an adequate level of fire protection?

BACKGROUND AND SIGNIFICANCE

The City of Eau Claire, population 61,872, is located in West Central Wisconsin. The municipal career fire department protects approximately 31.90 square miles. The mutual-aid agreements that Eau Claire holds include 10 additional area fire departments, serving an estimated 1100 square miles and additional 69,000 citizens. Annually, the Eau Claire Fire Department responds to an average of 4,500 emergency responses (City of Eau Claire, 2000). The City of Eau Claire Fire Department employs 76 line personnel, 8 chief officers, and 2 administrative assistants. The Eau Claire Fire Department responded to 4463 emergency incidents for 1999, 3151 emergency medical service calls, 1254 fire related calls and 58 miscellaneous calls (HazMat, special rescue, etc.). Within the City of Eau Claire there are over 2,767 commercial properties. Fire sprinklers protect 135 or five percent of all commercial properties (City of Eau Claire, 2000).

The National Fire Protection Association (NFPA), International Fire Code (IFC) and Insurance Services Office (ISO) have standards for fire flow requirements in structures. The standards are created to help departments ensure adequate staffing at the incident, and deliver adequate fire flow to control or suppress the fire. Most fire deaths and injuries occur in the home. The overall leading causes of deaths and injuries are dominated by causes most closely associated with residential properties (USFA, 1998). Non-residential structure fires, while they account for less than 10 percent of the fires, accounted for nearly half of the nations fire loss (USFA, 1998). Residential and non-residential combined account for 85 percent of all dollar loss (USFA, 1998).

The calculations and information show the Eau Claire fire department is not staffed

adequately to effectively control the demand that fire poses in the City of Eau Claire. The majority of structures that are non-sprinkled are adequately protected by current fire flow potential and staffing requirements. However, those buildings over 5000 square feet pose a dangerous impact to the City of Eau Claire emergency services.

Emergency Medical Service (EMS) incidents have increased and have caused fire units to become more involved with EMS delivery, leaving inadequate fire response capabilities for the city. The Eau Claire fire department has seen the following annual increase in EMS response, 1995 there were 2466 EMS calls, 1996 had 2687, 1997 had 2703, 1998 had 2728, and 1999 seen 3151 EMS incidents (City of Eau Claire, 2000).

The result of this research is significant to the City of Eau Claire. It will identify the trends of the Eau Claire Fire Department response times related to fire incidents over the past five years. It will assist in determining if the department can provide adequate staffing levels to meet fire flow requirements set by ISO and USFA. The research will help to determine which commercial properties of certain square footage are not adequately protected in reference to fire flow requirements. Finally, once the properties are identified that are not protected, the department can recommend fire sprinklers and encourage the city to pass an ordinance covering new commercial properties.

This research paper was developed to satisfy the Executive Fire Officer Program applied research requirement associated with Executive Leadership course at the National Fire Academy. This research related to Unit V - Influencing of the course by addressing possible strategies for a possible fire sprinkler ordinance.

LITERATURE REVIEW

The literature review will be utilized to examine the feasibility to adopt a stricter fire sprinkler ordinance for the City of Eau Claire. An overview of fire sprinkler effectiveness, codes and standards, impact of the fire sprinklers to the community, and the implications to cities without an ordinance will be researched.

Effectiveness of Fire Sprinklers

Fire Sprinklers have been in operation throughout the United States for over 125 years, and continue to function as they were originally designed. When sprinklers are present, the chances of dying in a fire and the average property loss per fire are both cut by one-half to two-thirds, compared to fires where sprinklers are not present (NFPA, 1999). Appendix A shows the estimated reductions in average loss per fire due to sprinkler in property classes from 1988-1997 (NFPA, 1999). Sprinklers may be the most reliable fire protection system known. Fire records reported by the NFPA have shown a 96.2% success record in the United States (NFSA, 1999). Aside from firefighting and explosion fatalities, there has never been a multiple loss of life in a fully sprinkled building due to fire or smoke (NFSA, 1999).

In the event that sprinklers do not produce satisfactory results, the reasons usually involve one or more of the following: 1) partial, antiquated, poorly maintained, or inappropriate systems; 2) explosions or flash fires that overpower the system before it can react; or 3) fire very close to people or to sensitive, valuable property such that fatal injury or expensive damage, respectively, can occur before a system can react (NFPA, 1999).

Fire development also plays a significant role in a fire's outcome. The second stage of fire is termed "Free Burning" and in this stage of fire a phenomena occurs which is called

flashover. Flashover is the transition between the growth and fully developed fire stages (Hall, 1998). During flashover, conditions in the compartment change very rapidly as the fire changes from one that is dominated by the burning of materials first ignited to one that involves all of the exposed combustible surfaces within the compartment (Hall, 1998). Flashover is the critical point because of its impact on victims and fire suppression resources (Residential Fire Safety, 2000).

When fire sprinklers are not protecting an area, the potential for flashover to occur is highly likely. Appendix B illustrates the time/temperature curve associated with fires in non-sprinkled areas (Isman, 1999). In this appendix, there is also a comparison time/temperature curve when sprinkler protection is provided to the fire room. Stopping the fire before flashover, dramatically reduces the threat to occupants in other parts of the dwelling. Flashover usually occurs between three and five minutes. Victims in the room of origin are affected about halfway to flashover because this is when the temperature, smoke and carbon monoxide make the room untenable to life. Sprinklers stop the fire before it makes the room untenable to life, so they dramatically increase the chances of survival in the room of origin (Residential Fire Safety, 2000).

Stopping flashover fires from occurring is vital to the effectiveness of fire departments operations. Fire departments that lack the suppression capabilities to adequately protect their communities can employ sprinklers to make up the deficiency. Increasing the number of sprinkled buildings accomplishes two things. First, installing sprinklers in a structure typically reduces the risk level. The second reason is because fire sprinklers are highly effective at stopping fires at pre-flashover, nearly all fire incidents in sprinkled structures will increase the

departments actual effectiveness (Coughlin, 2000).

Carbon Monoxide (CO) is a colorless, odorless, tasteless gas produced in fires and during such fires carbon monoxide levels increase. As shown in Appendix B, a fire in a building without sprinklers may produce excessively high amount of CO (Isman, 1999). CO levels above 1500 parts per million (ppm) cause immediate danger to life and health (IDLH). In a sprinkled building, CO levels are lower, reducing the number of ill effects (Isman, 1999).

Codes and Standards

The Wisconsin Administrative Code, Department of Commerce regulates the general requirements for Automatic Sprinklers within Comm 51.23. This code states that all automatic fire sprinkler systems shall be designed and installed in accordance with NFPA No. 13, except as permitted in Comm chapters 54 to 62. Throughout these sections specific details are listed for requirements in the different types of occupancies. Sprinkler requirements are based on building occupancy and on the height of the building (Appendix C). This appendix identifies occupancies in assembly areas, business occupancies, factory and industrial occupancies, hazardous occupancies, mercantile occupancies, and residential occupancies (Wisconsin Administrative Code, 1999).

Wisconsin cities are limited on what sprinkler ordinances they can enact in their community. Comm 66.04 “Limitations” states “ no municipality may enact an ordinance on any subject falling within the scope of this chapter” (Wisconsin Administrative Code, 1999). Comm 66 is the multifamily dwelling code and only pertains to the regulations of these properties. Comm 66.04(e) and (g) both identify that preexisting stricter sprinkler ordinances in multifamily dwellings contain 20 or less attached dwelling units. The municipalities who had stricter

sprinkler ordinances prior to and remained in effect after May 1, 1992, may continue that ordinance.

State of Wisconsin has adopted several NFPA standards pertaining to automatic sprinklers by reference (Wisconsin Administrative Code, 1999):

NFPA 13 – 1996 Installation of Sprinkler Systems.

NFPA 13-R – 1996 Sprinkler Systems in Residential Occupancies up to and Four Stories in Height.

NFPA 15 – 1996 Water Spray Fixed Systems for Fire Protection.

NFPA 20 – 1996 Installation of Centrifugal Fire Pumps.

NFPA 22 – 1996 Water Tanks for Private Fire Protection.

NFPA 24 – 1995 Private Fire Service Mains and their Appurtenances.

NFPA 25 – 1998 Inspection, Testing, and Maintenance of Water Based Fire Protection Systems.

The United States Occupational Safety and Health Administration (OSHA) has guidelines for installing and maintaining sprinkler systems. They are contained in the Code of Federal Regulations (CFR) Title 29, Section 1910.159 (Saks, 2000). An important provision is that OSHA requirements are applicable only when OSHA standards require a sprinkler system (Saks, 2000).

The Insurance Service Office (ISO) is an agency that sets insurance rates which are used as a bench mark for that specific building by all member insurance companies (Isman, 1995). The ISO also evaluates fire departments on their capabilities and resources, which establishes a fire rating for that particular municipality. Individual buildings are then evaluated for fire base

rates and its contents.

The International Building Code (IBC) has recently been under development that is designed to replace the BOCA National Building code (BNBC), the Standard Building Code (SBC), and the Uniform Building Code (UBC). This standardized code has many potential advantages of code requirements and the installation standards will greatly enhance fire protection (Endthoff, 1999). It is noted by Endthoff that the IBC will improve fire safety in all buildings, permit lower construction cost, identify different types of construction, increase basic allowable areas, permit area increases for approved open space and sprinkler protection, permit one additional story for sprinkled buildings, require area reductions based on building height, and expand sprinkler requirements and trade-ups. Currently, the State of Wisconsin is looking at the adoption of the IBC in the year 2002.

The State of Wisconsin is also researching the adoption of a nationally recognized Fire Code. NFPA 1 or IFC are being debated and evaluated by numerous state groups for their individual properties and effectiveness. Code officials recognize the need for a modern code addressing conditions hazardous to life and property from fire explosion, hazardous material storage, handling or use and the use and occupancy of building and premises (IFC, 1999).

The IFC has minimum required fire flow and flow duration for buildings (Appendix D). This table in appendix D compares the type of construction and the fire area in square feet to the fire flow in gallons per minute. This table also identifies the required flow duration in hours.

As determined by recommended standards established by the IFC, ISO and the USFA, a 5000 square foot building would require a fire flow of 2000 gallons of water per minute and the staffing of 18 firefighters. Six firefighters should be on-scene within 3.5 minutes, twelve

firefighters within five minutes and eighteen firefighters within 6.5 minutes. Appendix E is an accumulation of response times, personnel, and fire flow required for buildings over 5000 square feet for 1999 in the City of Eau Claire. One hundred and ten of Eau Claire's major fires were analyzed, with 26 of these fires occurred in buildings over 5000 square feet. The Eau Claire fire department was unable to meet the minimum number of firefighters required to provide adequate fire flow.

Importance of a Sprinkler Ordinance

Even though the fire service expends many staff hours trying to market the positive effects of sprinklers, there will always be those driven by the dollar or political pressures who oppose it (Stacey, 1992). Many obstacles have limited the promotion of sprinkler systems nationwide. This is due to economic concerns and the lack of understanding by contractors and property owners (Clark, 1992). Other contributing factors are resentment of government interference, and citizens that just don't think fire will happen to them (Clark, 1992). It is easier to line up political support for an ordinance that has minimal cost impact than one where the cost has not been lowered (Coughlin, 2000).

Many times people oppose things they do not understand. This often is the case when it comes to sprinkler system installation. Sprinkler systems are viewed by some as a life saving measure, an economic incentive, labor saving potential, reliable, a way to reduce fire loss, a means to protect property and controversial (Stacey, 1992).

Life safety is the overall goal of all fire service agencies in the United States. Sprinklers help to achieve this goal because sprinklers do not rely upon human factors such as familiarity with escape routes or emergency assistance. They go to work immediately to reduce the danger

(NFSA, 1999). Sprinklers prevent the fast developing fires of intense heat which are capable of trapping and killing dozens of building occupants (NFSA, 1999).

Fire sprinklers not only provide excellent fire protection, they also represent an excellent investment opportunity for building owners (Isman, 1995). There are at least six ways in which fire sprinklers help put money back into the pocket of the building owner: Insurance savings, income tax deductions, life safety code compliance, federal legislation, liability avoidance, and no business interruption (Isman, 1995).

Rate decisions in the insurance industry are guided by the ISO, an advisory organization. (USFA, 1989). In 1996, the City of Brookfield, Brookfield Wisconsin asked its insurance company underwriter for information on insurance costs associated with several occupancies within their city (DeMoss, 1996). The insurance underwriter provided the current manual rate that impacted both the building and its contents, along with a test rating for the properties. The percentage change for the properties reflected approximately a 40% reduction in insurance rates. This represents manual rates that the ISO provided the underwriter as a starting point to the underwriter process. The underwriter then reviewed the specific risk, based on the individual companies underwriting standards. The underwriter then adjusted the rates up or down based on the deductible, insurance coverage requested and the safety program in place. These rates can vary for a specific location from underwriter to underwriter depending on the debits and credits available through that company. It would be stated that a non-sprinkled building that is being charged $5,000 a year for fire protection, would be charged less than $3,000 if sprinklers were installed (DeMoss, 1996)

The discount on any particular policy is determined on a case-by-case basis, particularly

for large policies, and is dependent on the evaluation of an underwriter. An underwriter bases actual rates on the reliability, maintainability, and expected performance of a fire sprinkler system, in addition to standard risk factors such as the local community fire protection rating and distance to the nearest fire hydrant and fire station (USFA, 1989).

Income tax deductions are allowed for businesses, which install fire sprinkler systems. Three types of deductions are allowed: a depreciation allowance for the value of the system; the interest on a loan; and a qualified rehabilitation tax credit (Isman, 1995).

Isman claims that the depreciation schedule varies depending on the type of occupancy. For residential occupancies the schedule is 27.5 years, while it is 31.5 years for commercial occupancies. Those buildings built before 1936, which go under major renovation, may receive a dollar for dollar tax credit in the first tax year which the building is placed back in service, says Isman.

The Life Safety Code requires that all high-rise apartments, hotels, and office buildings be fully sprinkled or have an engineered life safety system. An engineered life safety system is composed of some combination of standpipes, detectors, smoke controls, exits, compartmentalization, and partial sprinkler protection. While this may appear to be less expensive than sprinklers initially, often in the long run sprinklers will pay for themselves while an engineered system will not (Isman, 1995).

The Hotel and Motel Fire Safety Act of 1990 (PL101-391) was passed into law by Congress to save lives and protect property by promoting fire and life safety in hotels, motels, and other places of public accommodation (USFA, 2000). This bill requires that all travel reimbursed by the federal government for overnight stays be in fire safe hotels. This bill also

requires that all conferences sponsored with federal money be held in fire safe hotels (Isman, 1995).

PL101-391 is applicable to all places of public accommodation, and requires that such properties are equipped with hard-wired, single station smoke detectors and an automatic sprinkler system, with a head in each guest room, and those properties lower then 3 stories in height are exempt from this requirement (USFA, 2000).

Recent court decisions involving large fire loss fires have stated that even though codes did not require fire sprinkler systems when the building was built, widespread use of these systems along with requirements for new buildings to have them, has led to public expecting sprinklers as a "reasonable level of care" (Isman, 1995). Isman goes on to say that these court decisions have required building owners to pay out more than $1 million per life lost in a fire; millions of dollars which would never have been paid out had a sprinkler system been installed.

Nobody ever plans on losing parts of all of a building, but a fire in a unsprinkled building will shut down major portions, if not the whole building. Loss in revenue to the owner takes many forms depending on the occupancy type (Isman, 1995). Building owners no longer get rent, manufacturers lose space and products, and hotels lose conference bookings and guests until the hotel is reopened. Fire sprinklers limit the fire and fire damage to a small area. After the fire, rooms can quickly be reoccupied minimizing losses in revenue (Isman, 1995).

Opponents to sprinkler systems try to bolster their arguments by focusing on the cost of installation and ignoring the benefits (Coughlin, 2000). They ignore the fact that when a fire occurs in a sprinkled structure, one-half or more sprinklers reduces the number of firefighters needed, thus reducing the impact on fire department resources. To a fire department with a high

EMS run load, every fire apparatus that is tied up at a fire scene deteriorates its EMS response (Coughlin, 2000). Coughlin also states that policy makers should also consider the reduced costs to the city (e.g., fewer stations per square mile, smaller water mains) and the benefits to taxpayers at large (e.g., better EMS and fire response). Table 1 identifies whom benefits from incentives. Coughlin points out that it is important to keep in mind that each incentive will act to reduce the overall cost of sprinklers.

In summary, literature has claimed that fire sprinklers systems can become available asset in the reduction of fire loss in each community. Fire sprinklers save lives, reduce fire damage within a structure, and keeps the number of fire personnel at a minimum still maintaining an acceptable level of fire protection.

TABLE 1. WHO BENEFITS FROM INCENTIVES

INCENTIVE	DEVELOPER	BUILDER	INSTALLER	OWNER
Reduced impact fees	X	X		
Low-cost loans	X	X		X
Increased density (narrower setbacks)	X			
Reduced fire flow requirements (smaller Main size, less storage, less maintenance)	X			
More space between hydrants	X			
Longer access road distance	X			
Longer distance from fire stations		X		
X				
Reduced access to building sides	X			
Narrower streets	X			
Fewer parking restrictions	X			
Longer cul-de-sacs	X			
Reduced radius of turnarounds at dead-ends	X			
Reduced permit fees		X	X	
Reduced or exempted plan review fees		X	X	
Reduced or exempted fees for field inspections		X	X	
Reduced fire resistance ratings, no parapet walls		X	X	
Increased distance to exits		X		
Single water line for domestic And sprinkler system			X	
No separate meter for sprinkler system			X	
No fee increase for larger meter			X	
No special connection charge			X	
Check valves instead of low-pressure principle Backflow-preventer			X	
Lower insurance premiums		X		
Lower ISO rating			X	
Reduction in annual fire service assessment				X
Property Tax reductions for sprinklers				X
No meter rental or monthly maintenance fees For water purveyors				X

PROCEDURES

Definition of Terms

Code -	A systematic statement of a body of law; one given statutory force.
Commercial -	Those properties within Eau Claire that are fire inspected bi-annually, and of larger size.
Depreciation -	To lower the price or estimated value of the property.
Fire Flow -	The flow rate of a water supply, which is available for firefighting.
Flashover -	The sudden spread of flame over an area when the materials become heated to there flash points.
Incentives -	Something that incites or has a tendency to incite to determination or action.
Insurance Underwriter -	Person from a specific insurance company who determines the risk of the property which translates to financial costs.
Liability –	Obligated according to the law or equity: Responsible.
Non-Residential –	Properties that include industrial and commercial properties, institutions, educational establishments, and vacant or under construction properties.
Ordinance -	An authoritative decree or direction set forth by a municipal governmental authority.
Residential –	A property that provides living accommodations to occupants. Also referred to as Home.

Retrofit - To furnish with new parts or equipment not available at the time of construction.

Standard - Something set up and established by an authority as a rule for the measure of quantity, weight, extent, value, or quality.

Stricter - More stringent then the minimum code required.

Story - The space in a building between to adjacent floor levels or between a floor and the roof.

Research Methodology

The desired outcome of this research was to evaluate the need for a possible ordinance of a stricter fire sprinkler requirement for the City of Eau Claire. The research was descriptive including a literary review was conducted to gather information about fire sprinkler ordinances. Information was gathered on codes, standards, and previous ordinances that have been created from other communities. A survey was conducted to help answer the research questions (Appendix F). The survey was sent to 40 Wisconsin fire departments that employed firefighters who are totally paid professionals or combination departments. Chief officers or fire prevention personnel were asked at each fire department to answer the survey questions. The survey was conducted on April 28, 2000, and was completed May17, 2000. The results of the survey appear in Appendix G of this report. Research into the Eau Claire fire department fire responses for the last five years was also conducted. The largest fire loss fires were evaluated for response times, fireground staffing levels, sprinkler performance, and personnel on-scene within certain time frames. The evaluation of these incidents appears in Appendix H of this report. A comparison sheet pertaining to sprinkler ordinances within the State of Wisconsin was also developed to

better understand what other communities require for their cities for fire sprinklers, Appendix I.

Research Limitations

The results from the survey do not represent the entire United States fire service or municipalities. Of the forty Wisconsin larger cities and fire departments contacted, the knowledge of the chief officers and fire prevention personnel varied in consistent reliability. Most chief officers answered the questions thoroughly but some answered questions without data to back-up their answers. The comparison of fire sprinkler requirements for Wisconsin communities were developed from interpretation of city ordinances and may be interpreted differently by others reading the code. Thirty-five surveys were returned for evaluation.

The results taken on the Eau Claire fire department from 1995 – 1999, does not represent all fire departments response, staffing and personnel on-scene throughout all the fire departments in the United States. It would be very difficult to assess all the nations fire sprinkler ordinances, and incident responses that fire departments encounter on a daily basis. The literature review was based on the effectiveness of fire sprinklers, codes and standards associated with fire sprinklers and the Eau Claire fire department, and the importance of sprinklers. Through a comprehensive research, it was discovered that a limited amount of current EFO (Executive Fire Officer) research papers were written on fire sprinkler ordinances. Numerous sources have been published, documented, and written pertaining to fire sprinklers and how to pursue a fire sprinkler ordinance. In determining an appropriate level of staffing required at certain fires, a dated publication was referenced to associate fire flow and staffing levels within certain time increments.

RESULTS

The literature review evaluated the effectiveness of fire sprinklers, the codes and standards, and the importance of a fire sprinkler ordinance. Within the questionnaire (Appendix F), fire departments were asked specific questions detailing their current fire sprinkler requirements. Appendix G identifies the accumulated results gathered from the respondents.

Answers to Research Questions

Research Question 1. To what standards and codes relating to fire sprinklers must the Eau Claire Fire Department and the City of Eau Claire adhere?

There are several regulations and standards that the Eau Claire Fire Department follows. The Wisconsin Administrative Code- Department of Commerce regulates the general requirements for Automatic Sprinklers systems in the State of Wisconsin. Commerce 51.25 references National Fire Protection Association (NFPA) standards: 13; 13R; 15; 20; 22; 24; and 25 all pertaining to automatic sprinklers. The United States Occupational Safety and Health Administration (OSHA) requires automatic sprinklers when applicable in specific operations.

In 2002, the State of Wisconsin will be adopting the International Building Code (IBC) which will improve fire safety in all buildings. The International Fire Code (IFC) or NFPA 1 will be adopted by the State of Wisconsin. The IFC provides fire flow requirements needed to provide adequate fire protection to those specific occupancies. The Insurance Services Office (ISO) and the United States Fire Administration (USFA) have established industry standards for staffing levels associated with fire flow requirements.

Research Question 2. What do other Wisconsin communities and fire departments require in relationship to a stricter fire sprinkler ordinance?

A survey was used to identify how many Wisconsin communities and fire departments have adopted a stricter fire sprinkler ordinance for their community. Thirty-five Wisconsin fire departments were surveyed, 11 fire departments (31 percent) require a stricter fire sprinkler for their community. Twenty-four fire departments (69 percent) required only the minimum state building code requirement for building fire protection.

Results from those communities with stricter fire sprinkler ordinances show that only 2 communities requires sprinklers in residential complexes, eight require sprinklers in commercial residential, nine communities require sprinklers in commercial properties, and two cities base their requirement on hazard types and public buildings. There were six cities that based the stricter requirement on square footage of the building. Three cities based the requirement on maintaining fire protection cost. Two cities based the requirement on construction problems such as lightweight construction, particleboard, etc. Three cities expressed concerns with life safety, basement fuel load, loss prevention, and quality of life issues for a stricter sprinkler requirement.

Three cities stated that they educated their local city government before attempting a stricter ordinance. Four communities developed a timeline for implementation of this requirement. Five communities require a retrofit adoption as part of their ordinance. Ten cities did not provide any assistance to the property owners for sprinkling the building.

The 24 communities that did not have a stricter fire sprinkler ordinance, twenty-two communities have not attempted to pursue a stronger sprinkler requirement in the past ten years.

Two cities that attempted to pursue an ordinance. Reasons given for failure includes: the mayor and building inspector were against the proposal, the cost of retrofitting, and municipal buildings and schools opposed the requirement. A comparison of 21 Wisconsin communities who require a stricter fire sprinkler ordinance is explained in Appendix I.

Research Question 3. According to the fire flow calculations, what size structure and type of structure should be sprinkled to ensure adequate level of fire protection?

The 2000 International Fire Code establishes the minimum required fire flow and flow duration for buildings (Appendix D). The United States Fire Administration (USFA) and the Insurance Services Office (ISO) has established a table, Appendix D, showing fire flow requirements in relation to suppression personnel on-scene.

A evaluation of the Eau Claire fire department's fire incidents from 1995 through 1999 was conducted. One hundred-ten fires were evaluated. Of these fires, twenty-six fires occurred in buildings over 5000 square feet. In accordance to the fire flow requirements and the suppression personnel required, the Eau Claire fire Department was unable to meet the requirement for proper fire protection in buildings over 5000 square feet.

DISCUSSION

The Eau Claire Fire Department has approached our community's safety and our firefighter safety with great concern. Today, the Eau Claire fire department has realized that all aspects of community safety be addressed to have an efficient and effective operation. Legal, moral, and ethical obligations demand that the department be committed to a safer community and workplace.

The Eau Claire fire department and the City of Eau Claire currently follow the state of Wisconsin requirements for buildings under the Wisconsin Administrative Code. These standards are the minimum allowed requirement for all Wisconsin communities. The Eau Claire fire department is charged with the responsibility to protect this community to its fullest. A method to provide proactive fire protection to the City of Eau Claire is to incorporate a stricter fire sprinkler requirement.

It would be assume that fire sprinklers should be installed everywhere to provide additional protection to everyone. Realistically, this is not practical or economical. The literature review identified how effective fire sprinklers can be, but more importantly how fire sprinklers control the fire before flashover occurs, and before the development of high levels of Carbon Monoxide.

Every city and community in the state and the country is different in its make-up and community demands. The Eau Claire fire department operates with three person engine companies to combat fire situations in the City of Eau Claire. Other cities may use five person engine companies to combat fires in their cities. It all depends on the demand on city services and what the city is comfortable with to provide the service. When one looks at the fire flow

requirements and staffing personnel on-scene, over the past five years of fire data, one can determine that the Eau Claire fire department cannot meet that prescribed standard.

If the City of Eau Claire would increase personnel, would the requirement be met? It is unknown, but it could be assumed that the department would be better staffed at fire scenes resulting in more efficient operations. The cost/benefit ratio on the cost of personnel to provide what protection would have to be determined. The implementation of a stricter fire sprinkler requirement would put the cost of fire protection on the owner of the property, not the taxpayer. These cost savings will reward through financial incentives and building requirement trade-ups.

Through evaluating the survey of 35 fire departments responding, results indicated that a stricter sprinkler ordinance for other cities is not a priority. Sixty-eight percent of those departments surveyed did not project a need for a sprinkler ordinance. It could be assumed that the state minimum is adequate for their particular city. It was surprising to see that only two of twenty-four cities who did not have a stronger ordinance attempted stronger local legislation.

Another area that the survey identified was the additional thoughts and concerns relating to a stronger fire sprinkler ordinance. It was mentioned several times within the survey that the State of Wisconsin should be the lead agency to require stricter requirements statewide. The survey indicated because of political opposition, local ordinances may be denied because of local interest. If the state attempted to pass stricter sprinkler requirements, lobbyists and contractors would possibly oppose the additional requirements. Educational opportunities must be directed to inform both local and statewide agencies not informed of the importance of fire sprinklers.

Realistically, all communities should be pushing residential fire sprinkler protection because of the frequency and the high loss of life associated in home fires. Because of the

thought of "more government intervention" people tend to be reluctant to be forced to adhere to this requirement proposal.

Each local community must evaluate its fire protection needs and if that need requires a stricter fire sprinkler ordinance to help their fire protection delivery, then that community must seek this requirement. As the Eau Claire fire department evaluates the information gathered in the literature review, other city ordinances and their successes, survey information from throughout the state and country, and computerized information, a stricter fire sprinkler ordinance appears obtainable and practical. The ordinance for the City of Eau Claire and the Eau Claire fire department must be specific to Eau Claire. A commitment to the successful development and operation of this ordinance must not only be the departments, but citywide. Fire department administration, line personnel, contractors, arctitects, planners, and City of Eau Claire council leaders must become involved to make a successful and effective fire sprinkler ordinance.

RECOMMENDATIONS

Recommendation #1

The Eau Claire fire department must pursue the development of a stricter sprinkler ordinance for the City of Eau Claire. The stricter ordinance would require all new construction over 5000 square feet to have fire sprinkler system protection. The community will gain additional fire protection without either higher taxes or increased insurance rates.

Recommendation #2

The Eau Claire fire department must educate city management, city council members, city manager, planning department, building inspectors, and fire department personnel on the need for a stricter sprinkler ordinance. A carefully thought out implementation plan that addresses city management concerns must be created. The gradual implementation of this plan should be brought to the city administration. Sufficient implementation time must be allowed to properly address the issue and to allow all of the community the chance to be informed on the rational of a fire sprinkler ordinance. Resistance should be expected by homebuilders, contractors, and developers. Educating and marketing the importance and the effectiveness of these devices will reduce reluctance.

Recommendation #3

Financial strategies for contractors, building owners, and developers must be explained to identify the economic benefits of fire sprinklers. It is necessary to educate the community on the truthful financial benefits that are available for this stricter requirement. Property owners must be aware that there may be benefits or reductions in insurance, tax deductions, and construction cost savings.

Recommendation #4

Reduction or the elimination of additional water hook-up charges for those properties that own fire sprinklers. Penalizing those properties that protect their buildings with fire sprinklers is punishment. The municipal services required for sprinkled properties are fewer less than those buildings with no fire protection.

Recommendation #5

In pursuit of a stricter fire sprinkler ordinance, the Eau Claire fire department must inform the City of Eau Claire legislative body of the manual suppression limitations in comparison of fire sprinkler performance. Information of fire station location, travel distances, staffing levels, and statistics of current operations must be provided to demonstrate the comparison. The Eau Claire fire department must not only present national statistics but must show the relevance by relating local statistics.

Recommendation #6

Recommendations to the city council must include incorporation of sprinkler protection into the city's municipal master development plan. Fire sprinklers can allow continued community growth while expanding the overall development of the city by keeping the fire protection costs down. Sprinklers can also keep its operating costs within acceptable limits while expanding the city's economic base.

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Appendices Not Included. Please visit the Learning Resource Center on the Web at http://www.lrc.fema.gov/ to learn how to obtain this report in its entirety through Interlibrary Loan.